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SCIENCE

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THE USE AND ABUSE OF THE IONIC
THEORY¹

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TWENTY-FIVE years have elapsed since Arrhenius advanced the theory that acids, bases and salts in aqueous solution are dissociated into their constituent ions. Now that the storm of contention aroused by this doctrine is clearing, it may not be inappropriate to consider in cooler blood this proposition of Arrhenius, to reinspect the foundations, and to weigh without prejudice the pros and cons, the successes and failures of the ionic theory.

To show that an electrolyte in solution suffers a change analogous to dissociation, Arrhenius brought forward evidence of three different kinds. First, he pointed out that the various methods of determining molal concentration in solution (freezing-point, boiling-point, vapor pressure, osmotic pressure), all of which are identical in principle and yield nearly identical results, indicate that in a salt solution the number of molecules dissolved, or less hypothetically the number of mols, is greater than the number calculated from the simple chemical formula of the salt.

The second argument rests upon the observation that in an aqueous solution of a strong electrolyte the properties are purely additive. Thus a dilute solution of hydrochloric acid has no properties which are peculiarly its own. It tastes sour, turns litmus red, dissolves metals, inverts sugar and possesses a number of other well-known properties, all of which are possessed in some degree by every acid. Moreover, it precipitates silver and mercurous salts, and

MSS, intended for publication and books, etc., intended for review should be sent to the Editor of SCIENCE, Garrison-on-Hudson, N. Y.

¹ Address of chairman of the Section of Physical Chemistry, Baltimore, December 29, 1908.